

# BULLETIN

## OF THE INSTITUTE OF METALS

VOLUME 3

AUGUST 1957

PART 24

### INSTITUTE NEWS

#### Autumn Meeting, Glasgow, Monday– Friday, 16–20 September 1957

As previously announced, the 1957 Autumn Meeting will be held in Glasgow from Monday to Friday, 16–20 September 1957, by kind invitation of the Scottish Local Section.

A provisional programme is given below. Members will receive a separately printed programme and reply form in connection with the meeting in due course.

A most interesting and varied series of visits has been arranged, and the Council hopes that these will be well attended by members and their guests.

#### PROVISIONAL PROGRAMME

##### Monday, 16 September

*Location* : Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow C.2.

All day. The Secretary's office will be open for the registration of members and guests.

2.0 p.m. Visits by invitation, for ticket-holders only who have *registered* for the meeting. Transport will leave from Elmbank Street.

##### *Members and Male Guests*

Mechanical Engineering Research Laboratories, East Kilbride.

Honeywell-Brown, Ltd., Newhouse, Lanarkshire.

Colvilles, Ltd., Ravenscraig, Motherwell.

Fescol, Ltd., Port Glasgow.

*Location* : Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow C.2.

6.0 p.m. Official welcome by Sir Andrew McCance, F.R.S., D.L., D.Sc., LL.D. (Chairman of the Reception Committee), Sir Hector Hetherington, K.B.E., D.L., M.A., LL.D., (Principal of Glasgow University), and Sir Robert Maclean (President of the Glasgow Chamber of Commerce).

6.30–7.30 p.m. Cocktail Party for members and guests *registered* for the meeting.

##### Tuesday, 17 September

*Location* : Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow C.2.

All day. The Secretary's office will be open for the registration of members and guests.

#### TECHNICAL SESSION

10.0 a.m. *Theme : Creep.* A discussion based on the following papers published in the Journal :

D. McLEAN and M. H. FARMER : "The Relation during Creep between Grain-Boundary Sliding, Sub-Crystal Size, and Extension" (Serial No. 1719: Oct. 1956).

H. BRUNNER and N. J. GRANT : "Calculation of the Contribution Made by Grain-Boundary Sliding to Total Tensile Elongation" (Serial No. 1724: Oct. 1956).

D. McLEAN : "A Note on the Metallography of Cracking during Creep" (Serial No. 1776: July 1957).

W. BETTERIDGE and A. W. FRANKLIN : "The Effect of Heat-Treatment and Structure on the Creep and Stress-Rupture Properties of Nimonic 80A" (Serial No. 1777: July 1957).

B. J. NIELD and A. G. QUARRELL : "Intercrystalline Cracking in Creep of Some Aluminium Alloys" (Serial No. 1778: July 1957).

*Location* : Central Hotel, Glasgow.

12.30 for 12.45 p.m. Lunch, by invitation of the Reception Committee.

2.0 p.m. Visits, by invitation, for ticket-holders only who have *registered* for the meeting. Transport will leave from outside the Central Hotel.

##### (a) *Members and Male Guests*

Henry Wiggin and Co., Ltd., Thornliebank.

G. and J. Weir, Ltd., Cathcart.

Babcock and Wilcox, Ltd., Renfrew.

##### (b) *Ladies* (members may also take part, if desired)

The Three Lochs.

Largs and the Ayrshire Coast.

Loch Lomond and Drymen.

*Location* : Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow C.2.

8.30 p.m. Twenty-Eighth Autumn Lecture : "Wear of Metals", by Dr. F. T. Barwell.

8.30 p.m. Talk for Ladies : "Scotland: An Explorer's Appreciation", by Mr. Tom Weir.



**Wednesday, 18 September**

All-day visits, by invitation, for ticket-holders only who have *registered* for the meeting, to works and other places of interest in or near Edinburgh. Transport will leave from Elmbank Street, Glasgow.

- 9.0 a.m. (a) *Members and Male Guests*  
British Aluminium Co., Ltd., Falkirk.  
Bruce Peebles and Co., Ltd., Edinburgh, 5.  
9.30 a.m. (b) *Ladies* (and members, if desired)  
Edinburgh, with morning free in Edinburgh.

*Location* : North British Hotel, Edinburgh.

- 12.30 p.m. Lunch, by invitation of the Reception Committee.  
2.0 p.m. Tour of Edinburgh for members and ladies, with guides.

*Location* : City Chambers, Glasgow.

- 7.30 p.m. Civic Reception for members and their guests who have *registered* for the meeting, by invitation of the Lord Provost, Magistrates, and Corporation of Glasgow (evening dress (tails or dinner jackets) or uniform, with decorations).

**Thursday, 19 September**

**PROGRAMME "A"**

*Location* : Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow C.2.

- 9.30 a.m. to 12 noon. The Secretary's office will be open.  
9.45 a.m. *Informal Discussion on "The Use of Light Alloys in Ship Construction"*, arranged by the Metallurgical Engineering Committee.

*Location* : The Berkeley Restaurant, 217 North Street, Glasgow C.3.

- 12.30 for 12.45 p.m. Lunch by invitation of the Reception Committee.  
2.0 p.m. Visits, by invitation, for ticket-holders only who have *registered* for the meeting. Transport will leave from outside the Berkeley Restaurant.

*Members and Male Guests*

Department of Natural Philosophy, The University, Glasgow W.3.  
Barr and Stroud, Ltd., Anniesland, Glasgow.  
North British Locomotive Co., Ltd., Springburn, Glasgow N.

**PROGRAMME "B"**

All-day visits for ladies (and members, if desired) who have *registered* for the meeting. Lunch by invitation of the Reception Committee. Transport will leave from Elmbank Street, Glasgow C.2.

- 10.15 a.m. Turnberry and Culzean Castle.  
The Trossachs, returning via Callender and the Lake of Menteith.  
Loch Lomond, Crianlarich, and Lochearnhead.

*Location* : The Grosvenor Restaurant, Glasgow.

- 7.0 for 7.30 p.m. Dinner-Dance for members and their guests who have *registered* for the meeting (evening dress (tails or dinner jackets) or uniform with decorations). Dancing until 1 a.m.

**Friday, 20 September**

*All-day sail on the Clyde in "Queen Mary II"* for members and their guests who have *registered* for the meeting. Morning coffee, lunch, and tea will be taken on board.

- 9.30 a.m. Embark at Broomielaw Pier, Glasgow.  
5.0 p.m. Disembark at Greenock.  
(approx.)  
6.0 p.m. Arrive back in Glasgow.  
(approx.)

**"Metallurgical Reviews"**

The latest issue of *Metallurgical Reviews* (No. 6) contains two papers: "Microchemical Analysis", by G. W. C. Milner and J. W. Edwards (Atomic Energy Research Establishment, Harwell) and "*p-n* Junctions in Silicon and Germanium: Principles, Metallurgy, and Applications", by G. C. Dacey and C. D. Thurmond (Bell Telephone Laboratories, Murray Hill, N.J.).

*Metallurgical Reviews*, published quarterly, is available only by annual subscription, the rates being: members £1 12s. 6d. (\$5.00), post free; non-members £2 2s. 6d. (\$6.50), post free.

**Election of Members**

The following 1 Overseas Sustaining Member, 19 Ordinary Members, and 2 Student Members were elected on 26 June 1957:

*As Overseas Sustaining Member*

SOCIÉTÉ NATIONALE D'ETUDE ET DE CONSTRUCTION DE MOTEURS D'AVIATION (S.N.E.C.M.A.), 92 boulevard Kellermann, Paris (13<sup>e</sup>), France.

*As Ordinary Members*

BRUEL, Pierre Lucien, Chef de Service de Fabrication et Adjoint à la Direction, Société Franco-Belge des Laminaires et Tréfileries d'Anvers (LAMITREF) S.A., Hemixem-Anvers, Belgium.

DALTON, Alan Leslie, M.Met., Research Metallurgist, William Jessop and Sons, Ltd., Whiston Grange, Moorgate, Rotherham, Yorks.

DE CARLI, Professor Felice, Dott.Chim., Professore ord. Metallurgia e Metallografia, et Direttore, Istituto di Metallurgia, Facoltà di Ingegneria, Università degli Studi, Via Eudossiana 18, Rome, Italy.

HILLNER, Gerhardt Friedrich, Dr.rer.nat., Laboratoriumsleiter, Vereinigte Deutsche Metallwerke A.G., Zweigniederlassung Carl Berg, Plettenbergerstrasse, Werdohl (Westf.), Germany.

HODGKINS, Peter, B.A., Assistant Commercial Manager, Capper Pass and Son, Ltd., Melton Works, North Ferriby, Yorks.

HONSEL, Albert, Inhaber und Leiter mehrerer Gesellschaften; Metallberatung Studiengesellschaft für Leicht- und Schwermetalle e.V., Breite Strasse 8, Düsseldorf, Germany.

HUI, Cho-Ying, B.Sc., D.I.C., Assistant Lecturer, Faculty of Engineering, University of Hongkong.

KRAUSE, Johannes, Dr.-Ing., Direktor, Stolberger Metallwerke K.G. von Asten, Lynen und Schleicher, Stolberg (Rhld.), Germany.

McLENNAN, John Ewan, A.S.T.C., A.I.M., Lecturer in Physical Metallurgy, Metallurgy School, Newcastle University College, Tighes Hill 2N, N.S.W., Australia.



MÄYRÄ, Matti Veikko, Dipl.-Ing., Engineer, Fiskars Osaakehtiö, Jokioinen, Finland.  
 MOFFATT, William Manning, Executive Vice-President, The American Brass Company, 414 Meadow Street, Waterbury 20, Conn., U.S.A.  
 NICHOLS, Frank R., President, Nichols Wire and Aluminum Company, 1725 Rockingham Rd., Davenport, Iowa, U.S.A.  
 NYYSSÖNEN, Pekka Tuomo, M.Sc., Engineer, Transmission Line Department, Imatran Voima Osaakehtiö, Box 138, Helsinki, Finland.  
 STEELE, Leslie Edwin, M.Sc., Senior Metallurgist, Plant Control Department, Northern Aluminium Co., Ltd., Rogerstone, Newport, Mon.  
 STRAUMANN, Fritz, Ing., Direktor, Institut Dr.-Ing. Reinhard Straumann A.G., Waldenburg, Switzerland.

TURNER, Cedric Edward, B.Sc., Ph.D., A.M.I.Mech.E., Lecturer, Mechanical Engineering Department, Imperial College of Science and Technology, London, S.W.7.  
 VASSEL, Charles Robert, B.Sc., Research Fellow, Research Institute of Non-Ferrous Metals, Budapest, Hungary.  
 WEARE, Arthur Thomas, Metallurgist, Motor Industry Research Association, Lindley, near Nuneaton, War.  
 WINKLER, Otto Christian, Dr.-Ing., Entwicklungsleiter, Gerätebau-Anstalt Balzers, Fürstentum, Principality of Liechtenstein.

*As Student Members*

KEY, Anthony John, Assistant Metallurgical Chemist, Murex Ltd., Ferry Lane, Rainham, Essex.  
 WHITLOW, Graham Anthony, Undergraduate, Department of Metallurgy, University of Manchester.

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**Benson, L. E.**, M.Sc., F.I.M.; Chief Metallurgist, Metropolitan-Vickers Electrical Co., Ltd.

**Berry, J. W.**, M.I.Mech.E.; Joint Managing Director, The Birmingham Aluminium Castings (1903) Co., Ltd.; Director, Birmid Industries, Ltd.; Director, Birmid Auto Castings Pty., Ltd. (Australia); Director, Cylinder Components, Ltd.; Chairman, Dartmouth Auto Castings, Ltd.

**Cuthbertson, Professor J. W.**, D.Sc., F.I.M., A.M.I.E.E.; Professor of Metallurgy, University of Nottingham.

**Dono, G. E.**, J.P.; Director, Morris Motors, Ltd., and associated companies.

**Finniston, H. M.**, B.Sc., Ph.D., A.R.T.C., F.I.M.; Chief Metallurgist, Research Group, U.K. Atomic Energy Authority.

**Ford, Professor Hugh**, D.Sc., Ph.D., Wh.Sch., M.I.Mech.E.; Professor of Applied Mechanics, Imperial College of Science and Technology, University of London.

**Francis-Carter, C. F. J.**, O.B.E., F.R.I.C., M.I.Chem.E., F.I.M.; Managing Director, Aluminium Wire and Cable Co., Ltd.

**Hamer, R. D.**, B.Sc., F.I.M.; Director, Aluminium Laboratories Ltd.; Director, Magnesium Company of Canada, Ltd.

**Holden, C. H. M.**, F.I.M.; Managing Director, The Hall Street Metal Rolling Co., Ltd.; Managing Director, Charles Clifford, Ltd.; Director, Metallisation, Ltd.; Director, Metallisation (Scotland), Ltd.; Director, The Midland Metallurgical Laboratories, Ltd.

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#### Sheffield

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SENIOR VICE-PRESIDENT

and

Not more than four Institute of Metals (Platinum) Medallists who are, or have been, members of the Council (to be selected by the President), with power to the President to co-opt not more than two other persons.

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Session 1957-58**

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 Clewlow, F.I.M.; L. H. Fairbank, B.Sc., A.I.M.; W.  
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 B.Sc.; A. H. Cottrell, Ph.D., B.Sc., F.R.S.; A. Hellawell,  
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 B.Sc.; R. E. Smallman, Ph.D.; A. E. W. Smith, Ph.D.,  
 B.Sc., F.I.M.; E. A. Thomas; G. G. Tucker, B.Sc.

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*Vice-Chairman* : H. S. S. Murray.  
*Hon. Secretary* : Matthew Hay.  
*Hon. Treasurer* : N. J. MacLeod.  
*Past-Chairmen* : W. A. Dunlop; E. A. Fowler, B.Sc.,  
 A.R.T.C.; George MacDonald, O.B.E., B.Sc.  
*Ordinary Members* : W. Bedford; R. E. Buttress (representing  
 Associates); J. Mowatt; A. M. McConnell, A.R.T.C.,  
 A.I.M.; L. Powell; H. J. Stuart; A. L. Wakeling;  
 B. H. Wylie, B.Sc., A.R.T.C.

**Sheffield Local Section**

*Chairman* : Professor R. W. K. Honeycombe, Ph.D., M.Sc.  
*Vice-Chairman* : R. C. Jewell, B.Sc., A.R.S.M., A.M.I.M.M.,  
 F.I.M.  
*Hon. Secretary and Treasurer* : A. J. MacDougall, M.Met.,  
 F.I.M.  
*Asst. Hon. Secretary* : R. B. Argent, B.Met.  
*Past-Chairmen* : A. Edwards, Ph.D., B.Sc., F.I.M.; F. Orme,  
 T.D., M.Met., A.R.I.C., F.I.M.; W. R. Maddocks,  
 Ph.D., B.Sc.  
*Ordinary Members* : K. W. Andrews, D.Sc., Ph.D., M.Sc.;  
 B. M. Cina, Ph.D.; B. J. Nield, B.Met.; Professor A. G.  
 Quarrell, D.Sc., Ph.D., A.R.C.S., F.Inst.P., F.I.M.; W.  
 Vickers, B.Met.

**South Wales Local Section**

*Chairman* : H. O'Neill, D.Sc., M.Met., F.I.M.  
*Hon. Secretary* : J. P. Dennison, Ph.D., B.Sc.  
*Hon. Treasurer* : P. J. Liptrot, M.Eng., A.I.M.  
*Past-Chairmen* : E. A. Hontoir, B.Sc., A.I.M.; K. M. Spring,  
 A.I.M.; J. S. Walton.  
*Ordinary Members* : P. W. A. Cuniffe; C. K. Davies  
 (representing Associate Members); P. W. Davies (representing  
 Student Members); C. F. J. Francis-Carter,  
 O.B.E.; D. W. Hopkins, M.Sc., F.I.M.; R. C. Staples;  
 G. H. H. Williams.

**PERSONAL NOTES**

DR. N. P. ALLEN has been elected a Member of Council of the Institution of Metallurgists.

MR. W. E. BALLARD has been elected Senior Vice-President of the Institution of Metallurgists.

MR. S. P. CASTLE is now Assistant Metallurgist at the Divisional Headquarters of the Southern Division of the Central Electricity Authority.

MR. R. CHADWICK has been elected Chairman of the Birmingham Metallurgical Society for the year 1957-58.

DR. W. A. DEAN has been appointed Assistant Development Metallurgist to the Aluminum Company of America, Pittsburgh, Pa. He was previously Chief Metallurgist at the Company's Cleveland Works.

MR. L. W. DERRY has been elected a Vice-President of the Institution of Metallurgists.

MR. F. DICKINSON has been elected a Member of Council of the Institution of Metallurgists.

MR. R. L. FANNON has taken up an appointment with Air Reduction Sales Company, 150 East 42nd Street, New York 17.

MR. G. FORREST, of Aluminium Laboratories, Ltd., has been awarded, jointly with Mr. K. Gunn, the George Taylor (Australia) Gold Medal of the Royal Aeronautical Society for a paper on "Problems Associated with the Production and Use of Wrought Aluminium Alloys".

DR. A. D. MCQUILLAN has been appointed Research Professor in Physical Metallurgy in the University of Birmingham.



MR. A. MORRIS is now a Technical Officer at the Waunarlwydd Works of Imperial Chemical Industries, Ltd., Metals Division.

DR. L. NORTHCOTT has been elected a Member of Council of the Institution of Metallurgists.

DR. GEORGE SACHS was recently awarded the Heyn Medal of the Deutsche Gesellschaft für Metallkunde and the Gauss Medal of the Braunschweigische Wissenschaftliche Gesellschaft. Dr. Sachs is Professor of Metallurgical Engineering and Associate Director, Syracuse University Research Institute, Syracuse, N.Y.

MR. R. L. SEGALL has left Melbourne University, where he was awarded the M.Sc. degree, and is now a research student at the Cavendish Laboratory, Cambridge.

DR. C. J. SMITHELLS has been appointed a member of the Council for Scientific and Industrial Research.

DR. P. B. A. WILLIS has left William Jessop and Sons, Ltd., and taken up an appointment with Imperial Chemical Industries, Ltd., Metals Division, Birmingham.

### Birthday Honours List

The following were mentioned in the recent Birthday Honours List:

DR. J. G. PEARCE, Director of the British Cast-Iron Research Association (C.B.E.).

MR. E. PLAYER, Managing Director of Birmid Industries, Ltd. (C.B.E.).

DR. J. H. WATSON, Chemist and Assayer at the Royal Mint (C.B.E.).

MR. A. WRAGGE, Chief Metallurgist, Vickers-Armstrongs (Engineers), Ltd. (O.B.E.).

### Death

The Editor regrets to announce the death of:

MR. WALTER CARTWRIGHT, O.B.E., M.Sc., Head of the Research Department of Thomas Bolton and Sons, Ltd., on 27 May, aged 60.

## OBITUARY

### Mr. Arthur Spittle

As briefly announced in the last issue of the *Bulletin*, Mr. Arthur Spittle, an Original Member of the Institute, died on 21 April, after a short illness, aged 82.

Arthur Spittle was born at Dudley, and began his business career in 1899 by spending a short time in the accountant's office of Tangyes, Ltd., Smethwick, before joining Allen, Everitt and Sons, Ltd., Smethwick, in 1900 as an accountant clerk. As a result of intensive study at night school and at home, Mr. Spittle qualified as a chemist three years later, and joined the laboratory staff. A year later, he combined the position of chemist with that of Assistant Manager, and in 1909 became Works Manager on the retirement of Mr. Douglas Everitt.

During the years that followed, Mr. Spittle played a

prominent part in numerous developments in production methods at the Kingston Works, particularly in the installation of additional plant required during the 1914-18 War for the production of condenser tubes and cartridge cases. He was appointed Technical Manager in 1914.

Among his most important achievements in the non-ferrous tube industry were the introduction, in 1920, of electric furnaces for melting deoxidized copper, and his work on the development of the cupro-nickel tubes, whose use in ships and in power stations significantly reduced condenser troubles. The remarkable corrosion-resisting qualities of these tubes did much to make possible the use of water-tube boilers in steamships.

In 1919, Mr. Spittle was appointed Secretary and Accountant, in addition to his other duties. After the acquisition of his firm by Imperial Chemical Industries, Ltd., in 1929, Mr. Spittle became Chief of the newly formed Technical Sales Department of I.C.I. at Witton. In this capacity he built up an effective service to customers on all matters relating to the use of non-ferrous tubes, and successfully co-ordinated the activities of the sales sections of the several companies that had merged with Imperial Chemical Industries, Ltd. He continued in this capacity until his retirement in 1945.

His pioneer work with cupro-nickel tubes took Mr. Spittle to every continent, with the exception of Australia, and to every European country except Russia and the Balkans. He paid six visits to the United States, where he made a close study of manufacturing methods and established many friendships with persons connected with the copper industry.

In addition to being an Original Member of the Institute, Mr. Spittle was a Past President, ex-Treasurer, and co-trustee of the Birmingham Metallurgical Society, and a Fellow of the Institution of Metallurgists. His interest in metals did not cease on his retirement, and he continued to attend technical meetings in Birmingham until a short time before his death.

## LETTER TO THE EDITOR

### The Growth and Deformation of Electro-deposited Platelets of Beryllium

The growth and deformation mechanisms of electro-deposited platelets of beryllium flake, kindly given by Murex, Ltd., Milford Haven, have been studied. Each macroscopic flake specimen appeared to be composed of several smaller single-crystal platelets arrayed one above the other, the orientation of each, as revealed by X-ray experiments, being such that the (0001) plane was in the plane of the platelet which was bounded by a {10 $\bar{1}0$ } prismatic face.

On the (0001) surfaces of the platelets hexagonal growth markings were frequently observed. In all cases, these were parallel to the close-packed  $\langle 11\bar{2}0 \rangle$  directions. As was also found by Blainey, Johnston, and Jones,<sup>1</sup> the growth steps were closed, and it appeared that each platelet consisted of a series of hexagonal layers arrayed one above the other, the area of the layers decreasing as the thickness of the platelet increased. Approximate measurements, made by using the electron microscope and a shadowing method on replicas stripped from the metal surface,<sup>2</sup> showed that most of the growth steps had a height of approximately 250 Å.

The following deformation characteristics were revealed



by Vickers hardness impressions made on the (0001) surfaces of the platelets:

(a) Only (0001) slip was observed. This was associated with much tilt activity, which was very often of an irregular nature, although plane tilt boundaries of the types  $\{10\bar{1}x\}$  and  $\{11\bar{2}x\}$  were found. In a few cases, the boundaries of the tilted regions were closed.

(b) Twins of the  $\{10\bar{1}2\}$  type were formed, usually associated with accommodation tilt boundary effects.

(c) Cracks of a  $\{11\bar{2}x\}$  type were associated with  $\{10\bar{1}2\}$  twins.

This supports the hypothesis<sup>3</sup> that mechanical twins can be nucleated by the stresses set up around the tip of a moving crack.

In further experiments, specimens (approximately 1 mm. thick) were bent around a cylindrical former of radius 5 mm. and about either a  $\langle 10\bar{1}0 \rangle$  or a  $\langle 11\bar{2}0 \rangle$  axis; the  $\{10\bar{1}2\}$  twins which formed were seen only on the compression surface. They sometimes lengthened and thickened as the bending increased, and when the bending was reversed so that the surface initially compressed came under tension, certain of them became smaller, and in some cases vanished altogether. Similar twin-boundary movement, caused by the application of an external stress, has been observed by Churchman<sup>4</sup> in titanium single crystals.

The author wishes to thank Dr. G. A. Geach and Dr. A. T. Churchman for their suggestions and interest in this work; Mr. P. H. Evans, Murex, Ltd., for supplying the beryllium; and Dr. T. E. Allibone, F.R.S., Director of the Research Laboratory, Associated Electrical Industries, Ltd., for permission to publish this letter.

E. SMITH.

Research Laboratory,  
Associated Electrical Industries, Ltd.,  
Aldermaston, Berks.

#### REFERENCES

1. A. Blainey, T. L. Johnston, and J. W. S. Jones, *Rev. Mét.*, 1955, **52**, 735.
2. D. E. Bradley, *J. Inst. Metals*, 1954-55, **83**, 35.
3. B. A. Bilby and R. Bullough, *Phil. Mag.*, 1954, [vii], **45**, 631.
4. A. T. Churchman, *J. Inst. Metals*, 1954-55, **83**, 39.

## OTHER NEWS

### Lectures on Selection of Engineering Materials

A course of 12 lectures on the Selection of Engineering Materials will be held on Tuesday evenings, from 7 to 9 p.m., commencing on 24 September. The fee is £1. 0. 0. Details and enrolment forms are obtainable from the Secretary (Materials Course), Battersea College of Technology, Battersea Park Road, London, S.W.11.

### Joining of Metals Conference

A one-day Conference on "The Wetting and Spreading of Liquid Metals on Solid Metal Surfaces" will be held at Birmingham University on 25 September 1957. Applications for enrolment forms (marked "Brazing Conference")

should be addressed to the Secretary, Department of Industrial Metallurgy, University of Birmingham, Birmingham 15. The enrolment fee of 15s. will include lunch and refreshments.

## APPOINTMENTS VACANT

### BRITISH THOMSON-HOUSTON CO., LTD.

The British Thomson-Houston Co., Ltd., has a vacancy in the Metallurgical Section of its Research Laboratory at Rugby for a graduate, preferably with some research experience. The work is concerned with research on the physical metallurgy of alloys and materials and their application to power plant, and offers excellent opportunities.

Applicants, not liable to National Service, are invited to write to the Director of Research, The British Thomson-Houston Co., Ltd., Rugby, stating age, qualifications and experience, and quote reference OCG.

### CONTROL OF METALLURGICAL RESEARCH

If your interest is in metallurgical research in the field of physical metallurgy, the modern chemical industry provides opportunity for a full and rewarding career. The industry is constantly seeking new materials and methods of utilizing them and is devoting a considerable research effort to these ends. A SENIOR METALLURGIST is required to control and direct the work of a group of graduates engaged in such work. The post is an attractive one with possibilities of advancement and the selected candidate will have every encouragement in the way of provision of equipment. Publication of work will also be encouraged. Candidates should have a good academic record and several years' experience in research work in a University, research organization, or in industry.

University graduates with a good degree and appropriate experience in the age group 30-40 are invited to apply for this appointment. Starting salary can be up to £2000 per annum for a suitable candidate.

Write, giving brief details of qualifications and experience to Box No. 435, The Institute of Metals, 17 Belgrave Square, London, S.W.1, quoting reference MR/4.

**LEADING METAL POWDER** producing company (not flaky) requires Engineer-Metallurgist with experience in powder production and use of powders. Apply, stating previous experience and salary required. Our staff is informed of this vacancy. Box No. 433, The Institute of Metals, 17 Belgrave Square, London, S.W.1.

### MELTING FURNACE SALES

**WELL-KNOWN FURNACE MAKERS** seek qualified technical sales engineer for induction melting furnace department. This is an important pensionable executive post with managerial prospects and requires an energetic man with sound induction furnace knowledge. Apply Box No. 434, The Institute of Metals, 17 Belgrave Square, London, S.W.1.

**PHYSICIST** or X-ray crystallographer with post-graduate research experience required for fundamental research work involving Geiger spectrometer techniques. Some knowledge of metallurgy desirable but not essential. Attractive salary according to age and experience. Reply in writing to Research Manager, Murex Welding Processes, Ltd., Waltham Cross, Herts.



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